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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,651	05/19/2004	Yuan-Hsun WU	NTCP0033USA	3650

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NORTH AMERICA INTERNATIONAL PATENT OFFICE (NAIPC)
P.O. BOX 506
MERRIFIELD, VA 22116

EXAMINER

MATHEWS, ALAN A

ART UNIT PAPER NUMBER

2851

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/709,651	WU, YUAN-HSUN	
	Examiner	Art Unit	
	Alan A. Mathews	2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7-12, 14-16 and 18 is/are rejected.
- 7) ☒ Claim(s) 4, 6, 13 and 17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: In the specification, paragraph # 22, lines 11 and 16, the use of the symbol \square to designate an angle instead of the symbol ϕ as shown in figure 3 of the drawings is objected to.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. Claims 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 14, it is not clear what is meant by “a space of the straight lines”. Does Applicant intend to recite “a space between the straight lines”?

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 5, 7, 8, 9, 11, 12, 14, 15, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang (U. S. Publish Patent Application No. 2005/0026047 A1) in view of either Robles et al. (U. S. Patent Application Publication No. 2004/0005089 A1), or Nocha et al. (U. S. Patent Application Publication No. 2004/0229133 A1), or Hsu et al. (U. S. Patent Application Publication No. 2005/0028129 A1). Yang discloses in figure 8 and page 3, paragraph # 39, providing a photomask having a first straight line feature 52 and a second straight line feature 52 parallel with the first straight line. Elements 90 are the first assist pattern between the first and second straight lines 52. Elements 90 comprise a plurality of geometric patterns with similar sizes arranged along a first line direction which is parallel with the first straight line. With respect to claim 5, the first and second straight line feature 52 are the two lines on opposite sides of the drawing, thus resulting in having two assist patterns 90 in between the first and second straight line features 52. Furthermore, figure 3b discloses two assist patterns 70 between straight line features 52. With respect to claim 11, Yang disclose in paragraphs # 20 and # 33, a width of an assist feature which is dependent upon the wavelength of the exposure source. Yang also discloses in the background discussion using a quasar mode (see page 1, paragraph # 11). Thus, Yang discloses the invention except for specifically disclosing using an aperture of Quasar 90 (which would be off-axis illumination). Robles et al. (U. S. Patent Application Publication No. 2004/0005089 A1) discloses in paragraph # 131 and # 132 using Quasar illumination, while paragraph # 133 and # 134 disclose providing assist features. Paragraph # 114 in Robles et al. discloses NILS. Socha et al. discloses in figure 4A and on page 2, paragraphs # 17 and #23, and pag3, paragraph # 32, the use of Quasar illumination and also

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assisted features. Hsu et al. discloses in figure 5 and page 6, paragraph # 72, the use of Quasar illumination. Tables 5 and 6 in paragraphs # 73 and #77 disclose using a wavelength of .248 (i.e. 248nm). Hsu et al. also discloses in paragraph # 9 the use of OPC. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide Yang with QUASAR illumination in view of Robles et al., Socha et al., or Hsu et al., for the purpose of providing a better illumination (producing a better resolution) and thus producing a better product.

5. Claims 3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Robles et al. as applied to claims 1 and 8 above, and further in view of Yu. Yang and Robles et al. disclose the invention except for the geometric patterns being square patterns. Yu discloses in figure 5A and column 5, lines 16-26, square assist features 504a – 504h. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the modified device of Yang and Robles et al. with square assist features in view of Yu for the purpose of producing a finer resolution and thus produce a better product.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Robles et al. as applied to claim 8 above, and further in view of Smith (U. S. Patent Application Publication No. 2002/0192570). Yang and Robles et al. disclose the invention except for the width of the assist patterns between any two straight lines are determined according to a numerical aperture (NA) of the lens. Smith discloses on page 4, paragraph # 43, that the size of the assist patterns 22 (ladder) are determined by the numerical aperture (NA) of the lens. It

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would have been obvious at the time the invention was made to a person having ordinary skill in the art to have the amount and width of the assist patterns in the modified device of Yang and Robles et al. be determined according to the numerical aperture of the lens in view of Smith for the purpose of ensuring that the assist feature 22 is sub-resolution and does not print, thus making a better final product.

Allowable Subject Matter

7. Claims 4, 6, 13, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The reasons for the indicated allowability of the dependent claims are as follows:

The prior art does not disclose or suggest that the length of the square patterns is approximately equal to a space between the first assist pattern and the first straight line and to a space between the first assist pattern and the second straight line in combination with all the other steps recited in the parent claims to dependent claim 4.

The prior art does not disclose or suggest a space between the second assist pattern and the first assist pattern, and a space between the second assist pattern and the first straight line are approximately equal to a space between the first assist pattern and the second

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straight line in combination with all the other steps recited in the parent claims to dependent claim 6.

The prior art does not disclose or suggest that the NILS of the straight lines can be optimized to a value above 2.5 in combination with all the other steps recited in the parent claims to dependent claim 13.

The prior art does not disclose or suggest that a length of the square patterns is approximately equal to a space between each of the straight lines and the adjacent assist patterns in combination with all the other steps recited in the parent claims to dependent claim 17.

Conclusion


8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patent to Chen et al. is cited to show reducing proximity effects by adds 1 lines called intensity leveling bars.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan A. Mathews
Primary Examiner
Art Unit 2851

AM